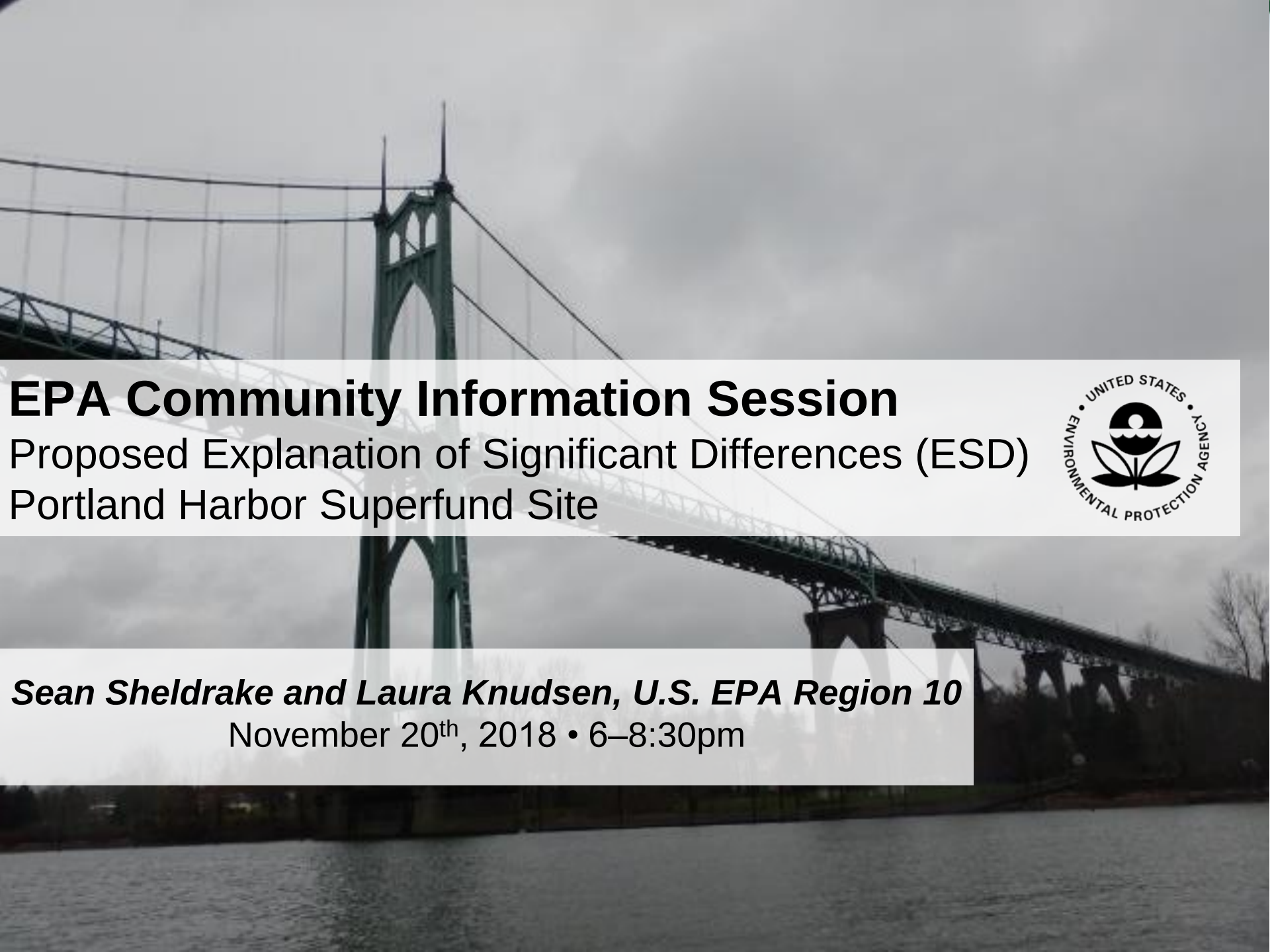


EPA Community Information Session

Proposed Explanation of Significant Differences (ESD)
Portland Harbor Superfund Site

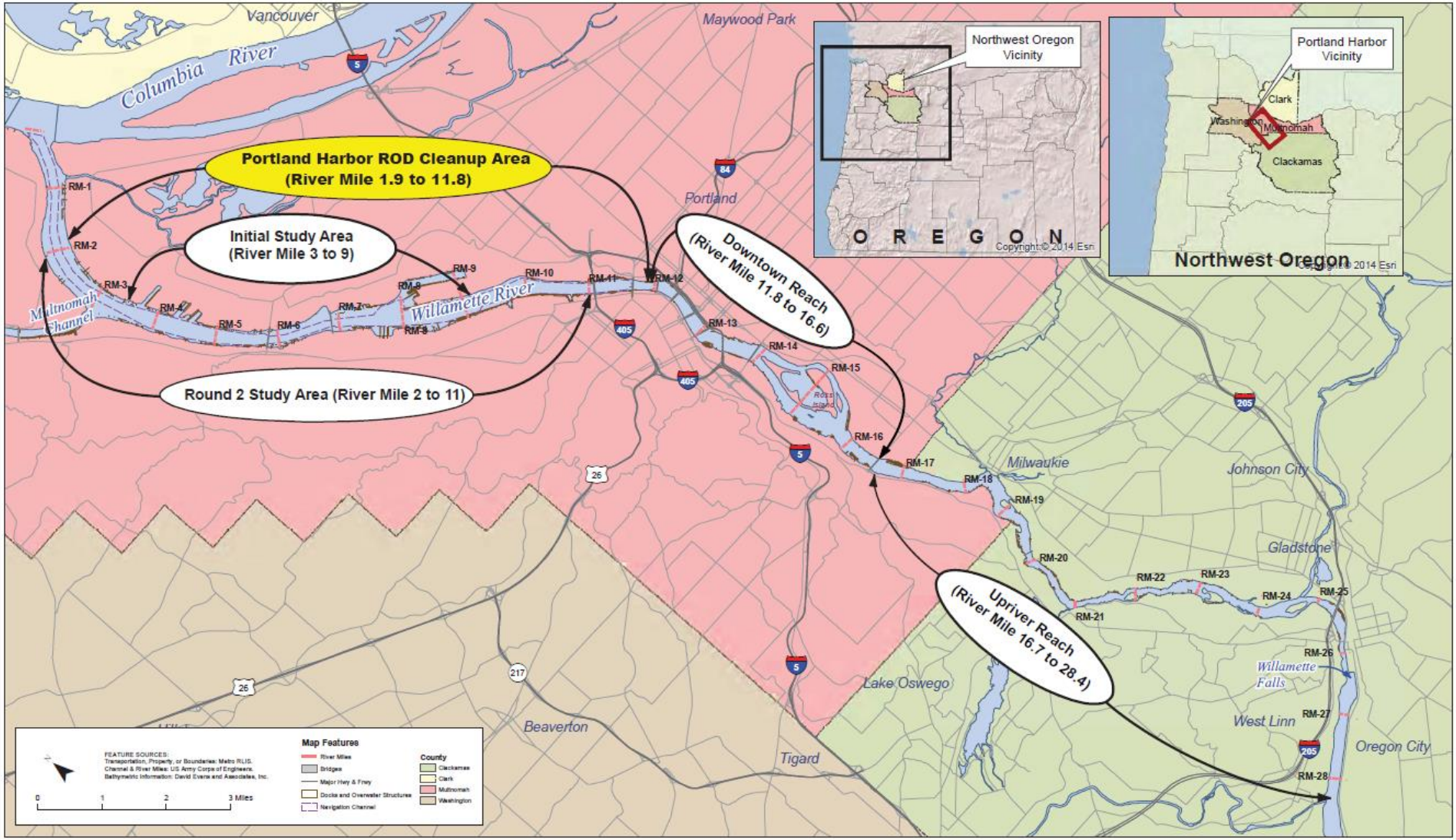
Sean Sheldrake and Laura Knudsen, U.S. EPA Region 10

November 20th, 2018 • 6–8:30pm

Agenda

- **Site background**
- **Why is there a proposed ESD (Explanation of Significant Differences)?**
- **What does this change mean for the Portland Harbor Superfund Site?**
- **Question and answer session**

Site Background



Site Background

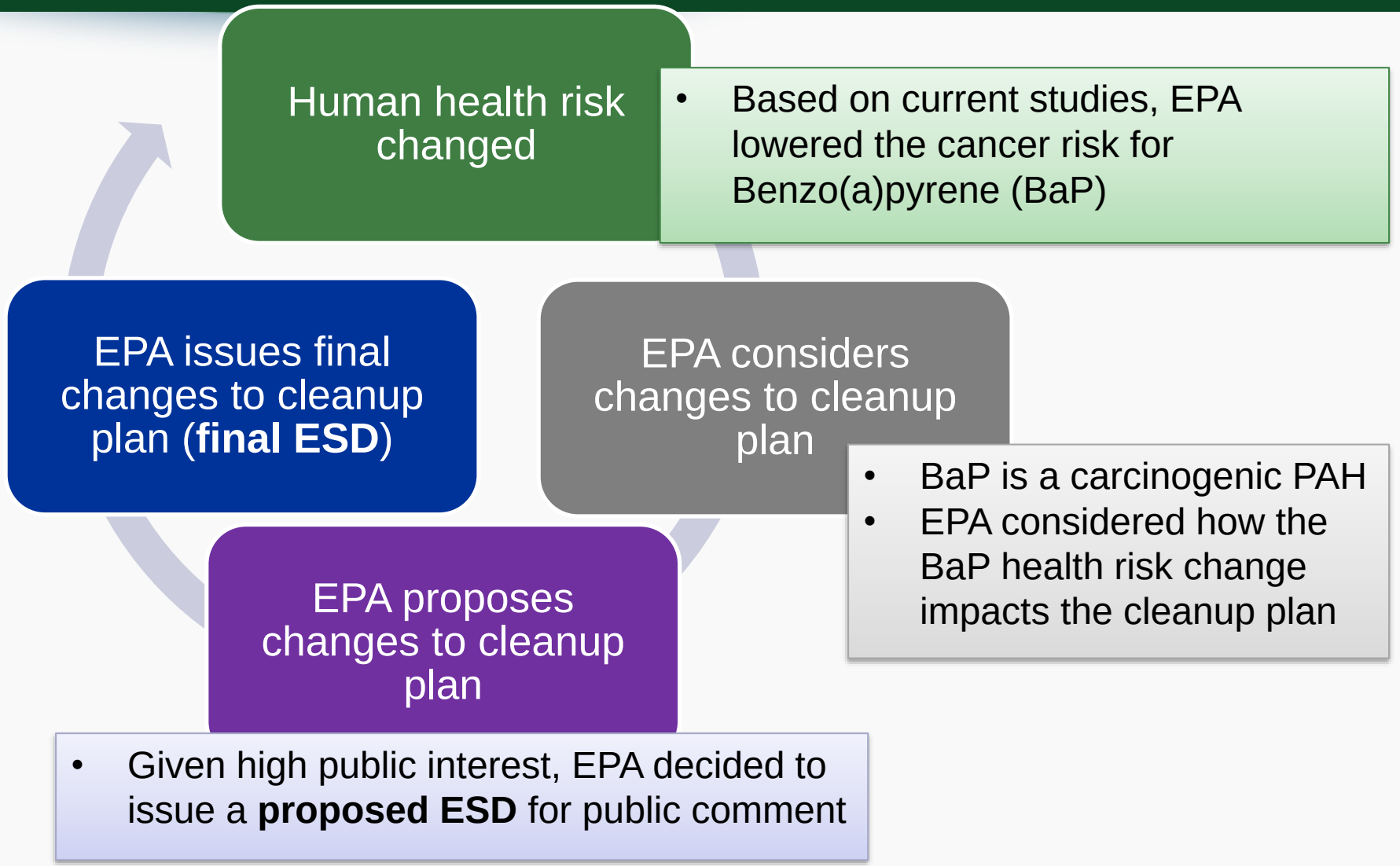
These Focused COCs are:

- ❑ The most widespread
- ❑ Have the most associated risk
- ❑ Address other COCs

- **Focused Contaminants of Concern**
  - ➢ **Polychlorinated Biphenyl (PCBs)**
    - ☆**Where Do They Come From?** Used in electrical equipment, oil, plastics
  - ➢ **Polycyclic Aromatic Hydrocarbons (PAHs)**
    - ☆**Where Do They Come From?** Produced when coal, oil, and gas are burned, spilled, etc….
    - ☆**Benzo(a)pyrene (BaP) is a PAH.** BaP cancer risk is used to assess cancer risk for other carcinogenic PAHs
  - ➢ **DDx (DDT, DDE, DDD)**
    - ☆**Where Do They Come From?** Commonly used in pesticides
  - ➢ **Dioxins/Furans**
    - ☆**Where Do They Come From?** Created when certain products are made, like herbicides, pulp/paper, or when products are burned.

Why is there a proposed Explanation of Significant Differences?

Proposed ESD (Explanation of Significant Differences?): What is it and why?



Why did the Benzo(a)pyrene health risk change?

- EPA's Integrated Risk Information System (IRIS) updated their BaP assessment in 2017
- EPA's IRIS program has worked for over 10 years on this assessment
- The BaP IRIS assessment was extensively reviewed with many agencies and scientists (next slide)
- Current studies show that cancer risk for BaP is about seven times less toxic for people who contact or ingest the chemical

What is the EPA IRIS Program?

- **Created in 1985** to provide a database of human health assessments for chemicals
- **Goal:** Foster consistency in the evaluation of chemical toxicity across EPA

Who reviewed this BaP cancer health risk change?

- **Some of the other Agencies who reviewed:**
  - Agency for Toxic Substances and Disease Registry
  - Department of Defense
  - National Aeronautics and Space Administration (NASA)
  - National Institute for Occupational Safety and Health
- **Public comments:** Assessment released for public comment in 2013
- **Peer review by 27 independent, expert scientists including:**
  - University of Washington, Seattle WA
  - University of California, Irvine CA
  - University of New Mexico, Albuquerque NM
  - Harvard School of Public Health, Boston MA
  - The University of Texas at Austin, Austin TX
  - University of Illinois, Chicago IL
  - National Institute of Health, Bethesda MD
  - Department of Statistics and Evaluation, American Cancer Society, Atlanta GA

What does this BaP change mean for the Portland Harbor Superfund Site?

What are PRGs, PTW and RALs?

- **Cleanup Levels:** Long-term contaminant concentrations that the cleanup must achieve to meet the Remedial Action Objectives. These also may be referred to as Preliminary Remediation Goals (PRGs).
  - Developed for all contaminants of concern on a media-specific (sediment, water, clam tissue, etc…) basis
- **Highly Toxic Principal Threat Waste (PTW):** Contaminant source material that requires special management due to high toxicity
- **Remedial Action Levels (RALs):** Define areas where capping and/or dredging must be conducted to facilitate natural recovery throughout the site
  - Separate RALs established in Portland Harbor for Navigation Channel and nearshore sediments

What does this mean for the Portland Harbor Superfund Site?

★ = Affected by change

RAO		Media
Human	RAO 1	Sediment ★
	RAO 2	Biota ★
	RAO 3	Surface Water
	RAO 4	Groundwater
Eco	RAO 5	Sediment
	RAO 6	Biota
	RAO 7	Surface Water
	RAO 8	Groundwater
H&E	RAO 9	Riverbanks

Remedial Action Objectives (RAOs)

- **RAOs:** Media specific goals for protecting human health and the environment
- Cleanup plan established RAOs and cleanup levels for sediment, groundwater, surface water, and river bank soils
- Any change in remedial action levels must consider impact on all RAOs

What does this mean for the Portland Harbor Superfund Site?

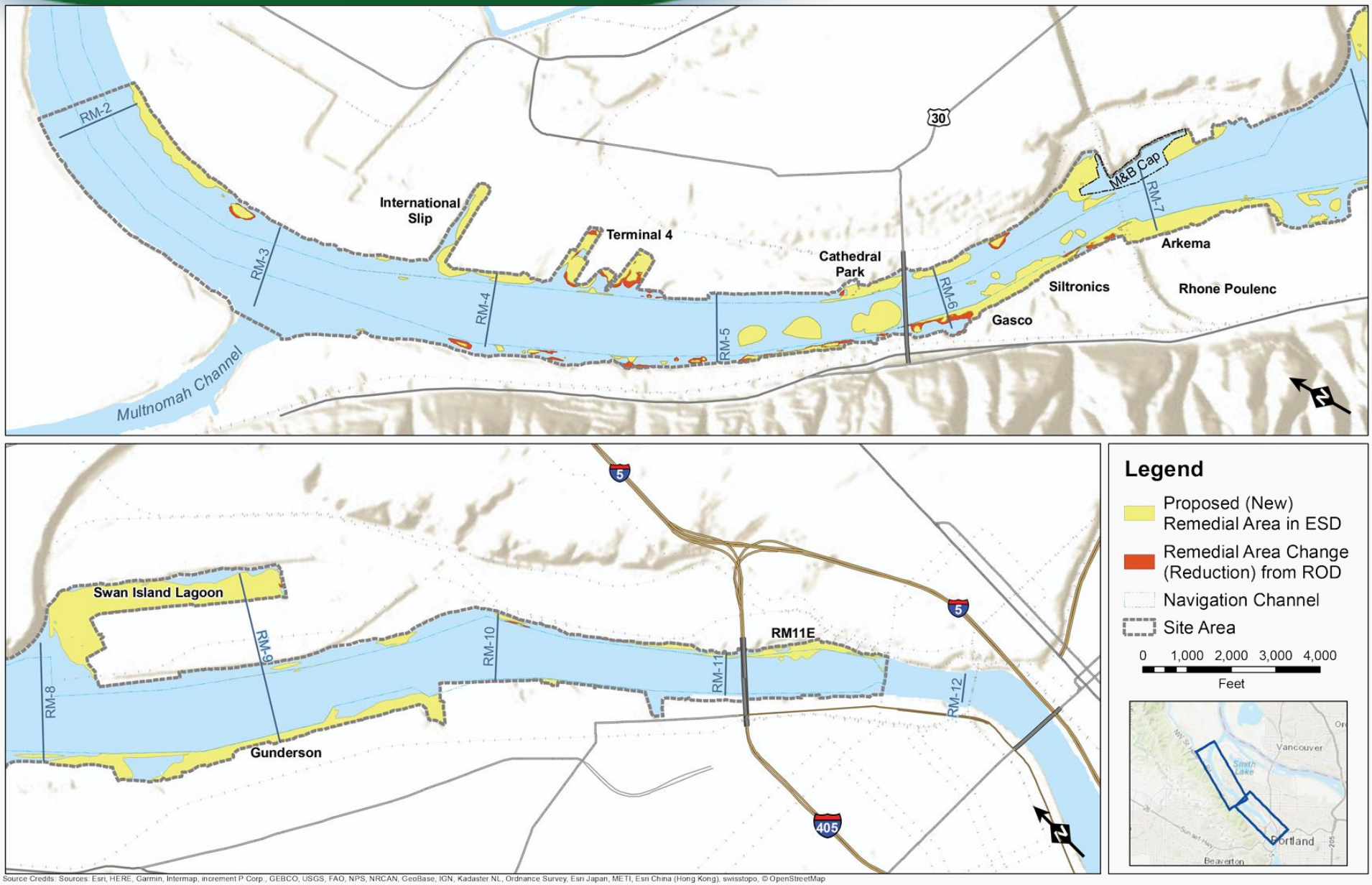
"BIG PICTURE"

	Total Remedial Area (Acres)	Cost
ROD	~364	~$1.05 billion
Proposed ESD	~347	~$1.015 billion
Change *From ROD to Proposed ESD*	~17 *4.67% decrease*	~$35 million *3.33% decrease*

What does this mean for the Portland Harbor Superfund Site?

Scenario	Impacted Area	ROD Value	Updated Value
Direct Contact cPAH Beach Sediment cleanup level	Beach Areas	12 µg/kg (parts per billion)	85 µg/kg
Direct Contact cPAH In-Water Sediment cleanup level	Nearshore sediment (excluding beach areas)	Not Included (106 µg/kg)	774 µg/kg
Clam Tissue Consumption cPAH Target Level	Site-Wide	7.1 µg/kg	51.6 µg/kg
Clam Consumption cPAH Sediment cleanup level	Site-Wide	**3,950 µg/kg** *(This should have been 39.5 µg/kg)*	1,076 µg/kg
Benthic Risk total PAH Sediment cleanup level	Site-Wide	23,000 µg/kg	23,000 µg/kg ***No Change Proposed***
Highly Toxic cPAH PTW Threshold	Site-Wide	106,000 µg/kg	774,000 µg/kg
Nearshore total PAH RAL	Nearshore Sediment (Outside the Navigation Channel)	13,000 µg/kg	30,000 µg/kg
Navigation Channel total PAH RAL	Navigation Channel Sediment	170,000 µg/kg	170,000 µg/kg ***No Change Proposed***

What does this mean for the Portland Harbor Superfund Site?



How can I be involved?

- **Provide written comments to EPA on the proposed ESD until Friday, December 21st:**
  - Send comments via **e-mail** to **HarborComments@epa.gov**
  - **Mail** Comments: Attn: Portland Harbor Superfund Comments, U.S. Environmental Protection Agency, 805 SW Broadway, Suite 500, Portland OR 97205
- **Review the webinar recording of the proposed ESD presentation on EPA's website:** **www.epa.gov/superfund/portland-harbor**
- **Attend an in-person proposed ESD community information session**
  - **Day & Time:** Tuesday, November 20, 6-8:30pm
  - **Location:** Ecotrust Building, 721 NW 9th Ave, Portland OR 97209
- **Attend EPA's December 12th public forum**

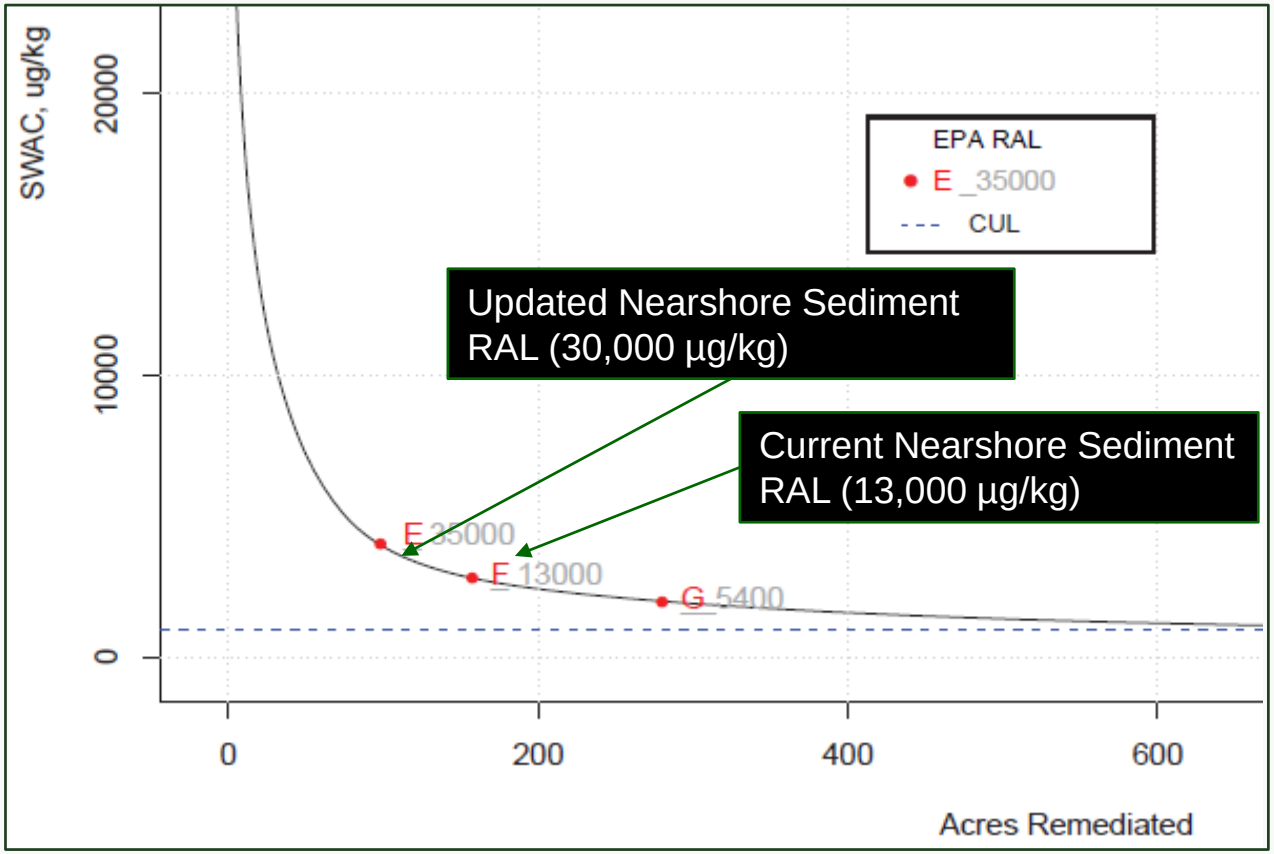
More Questions?

- **Sean Sheldrake,** EPA Remedial Project Manager
  - **E-mail:** **sheldrake.sean@epa.gov**
  - **Phone:** 206-553-1220
- **Laura Knudsen,** EPA Community Involvement Coordinator
  - **Email:** **knudsen.laura@epa.gov**
  - **Phone: 206-553-1838**

Extra Slides

Proposed Nearshore Total PAH RAL Change

- **EPA proposes revising the total PAH nearshore RAL from 13,000 µg/kg to 30,000 µg/kg:**



Why did the proposed navigation channel total PAH RAL not change?

- **The total PAH navigation channel RAL of 170,000 µg/kg <u>will not change</u> because of human health and benthic (critters that fish eat) risk that is present**

- **Other Issues:**
  - The navigation channel has benthic community habitat
  - The total PAH cleanup level of 23,000 µg/kg is exceeded in the navigation channel between RM 5 – 7 with unacceptable risk to the benthic community
  - Natural recovery processes such as sediment deposition within the navigation channel are not happening for contaminated areas between RM 5 – 7
  - An increase in PAH loading to surface water is happening downstream of RM 6.3

Development of Human Health Clam Consumption Clean-up Levels

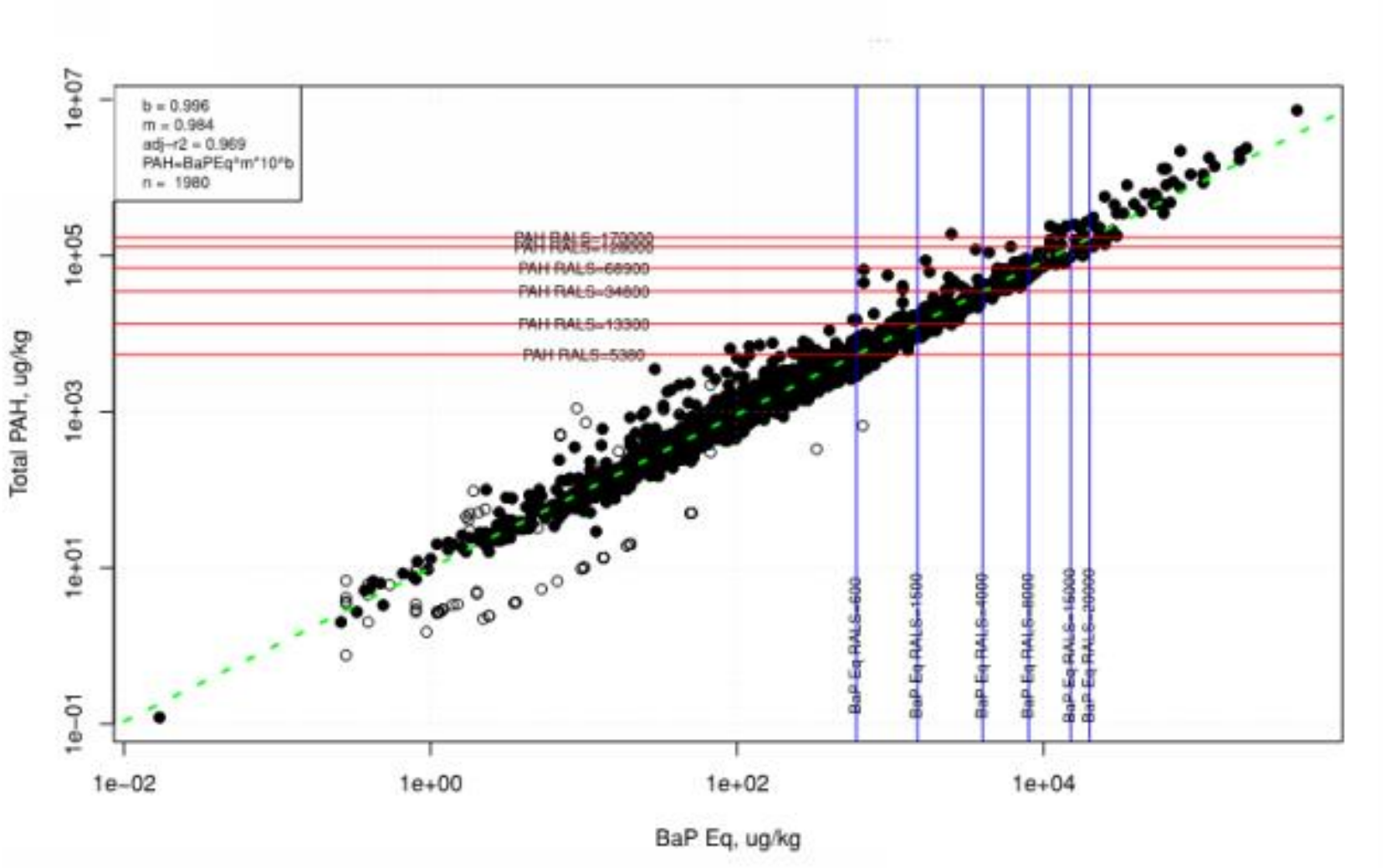
- The human health clam consumption target tissue level increases by a factor of 7.3 from 7.1 µg/kg to 51.6 µg/kg due to the BaP health risk change

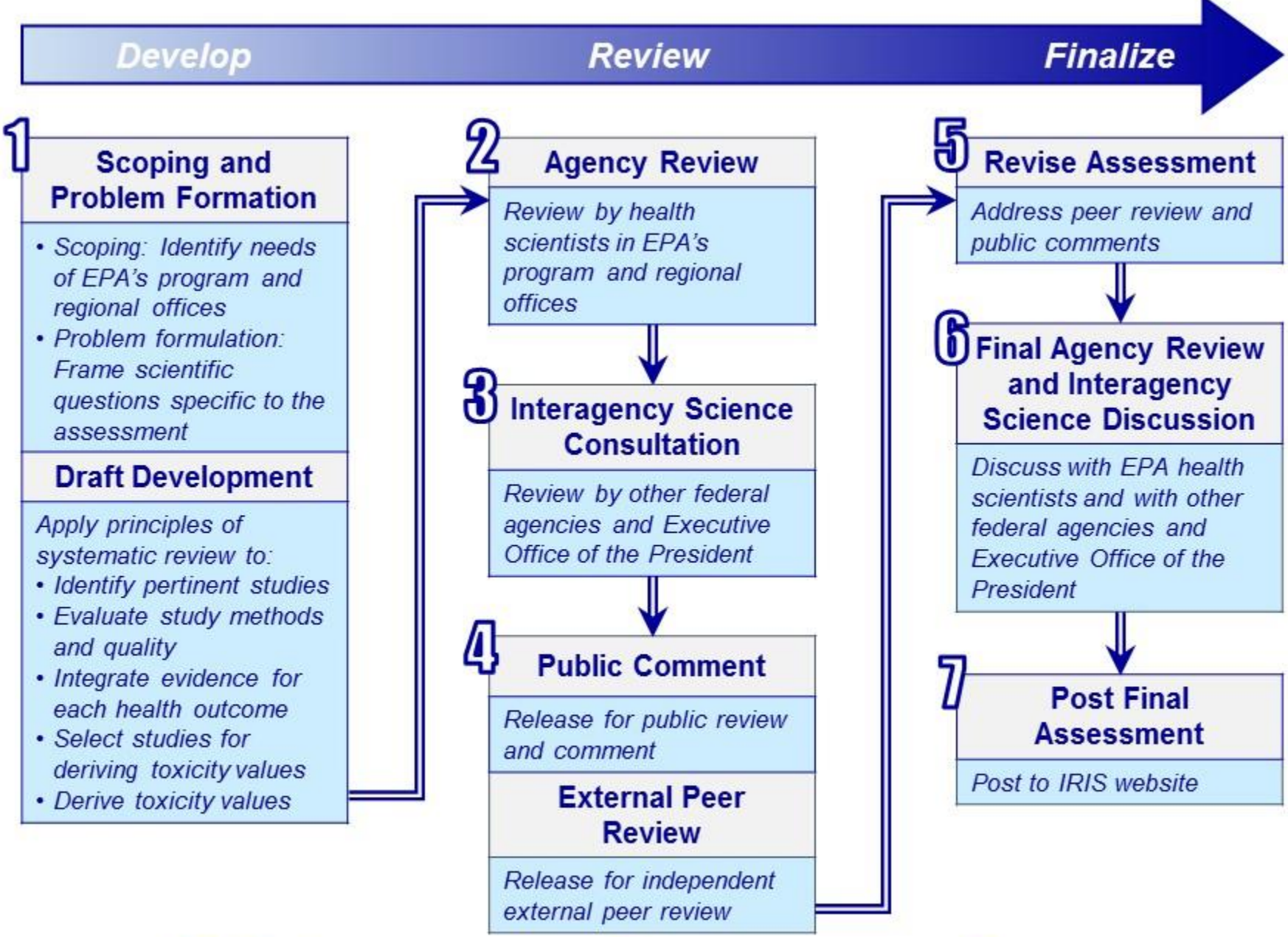
- The relationship between cPAH (BaP Eq) clam tissue levels is a **non-linear** log-log relationship represented by the following equation:

$$ln(PRG_{sed}) = \frac{((ln(C_{tissue}) - (\ln(f_{lipid}) - \ln(CF) + 2.47)}{0.6} + ln(f_{oc})$$

- Based on the non-linear relationship, the cPAH human health clam consumption CUL increases from 39.5 to 1,076 µg/kg due to the BaP health risk change

Total PAH - cPAH Relationship





IRIS Assessment Development Process

The 7-step process has not changed. This figure refines earlier versions and includes the 2013 IRIS enhancements and the incorporation of systematic review approaches.

Doesn't a decrease to 1 per mg/kg-day from 7.3 per mg/kg-day mean BaP is more carcinogenic?

- **Short Answer**: No
- **This decrease means that someone has less risk of developing cancer if they are exposed to BaP**

Cancer Risk = Lifetime Average Daily Intake x Cancer Slope Factor (CSF)

If **CSF** goes down, **Risk** goes down

- **However, the cleanup level may* increase (less restrictive) because one divides by the cancer slope factor (CSF):**

$$CUL_{sediment} = \frac{Target\ Excess\ Cancer\ Risk\ x\ Averging\ Time}{CSF\ x\ Exposure\ x\ Age\ Adjusted\ Dermal\ Contact\ x\ 10{-}6\ kg/mg}$$

- **Remedial Action Levels (RALs) may* also increase to prevent cleaning up sediments that do not pose unacceptable risk**

**Depends on the area within the Site*

Has EPA updated health risk values to be less toxic for other chemicals?

- IRIS does not keep track of this type of information.
- IRIS evaluates the available data with current methodologies to interpret the currently available science as best we can.
- This evaluation can lead to characterizations of toxicity that may be relatively more or less toxic than previous characterizations.

Did EPA consider the non-cancer reference dose (RfD) change?

- **Short answer:** Yes, EPA previously considered the RfD change.

- **Long answer:**
  - The Toxicological Review of Benzo(a)pyrene (USEPA, 2017) also included a non-cancer oral reference dose of 0.0003 (mg/kg-day).
  - This value was utilized in the development of Preliminary Remediation Goals (PRGs) for the Portland Harbor Site (See Table B3-2 of the Portland Harbor Feasibility Study).
  - PRGs for non-cancer risk presented in Appendix B of the Portland Harbor Feasibility Study, are significantly higher than cancer risk and thus are not a factor for developing PAH Cleanup Levels at the Portland Harbor Site.

What was the exact cancer slope factor change for BaP?

PREVIOUS CSF	REVISED CSF* **Revised January 19, 2017*
7.3 per mg/kg-day	1 per mg/kg-day

Application of Benzo(a)pyrene Potency Equivalence Factor

- The carcinogenicity of PAHs is assessed relative to benzo(a)pyrene using a potency equivalence factor (PEF)
  - PEFs range between 1 and 0.001 for individual carcinogenic PAHs
  - Allows estimation of total carcinogenic PAH risk measured as benzo(a)pyrene equivalents (BaPEq)
  - The BaP slope factor change affects all carcinogenic PAHs

Location	Chemical	EPC (ug/kg)	B(a)P CSF (mg/kg-day)$^{-1}$	Potency Equivalent Factor	Adjusted CSF (mg/kg-day)$^{-1}$	Daily Dose (mg/kg-day)	Cancer Risk
RM 7 West	Benzo(a)anthracene	2.2E+03	1	0.1	0.1	7.20E-07	7.E-08
RM 7 West	Benzo(a)pyrene	1.7E+03	1	1	1	5.50E-07	6.E-07
RM 7 West	Benzo(b)fluoranthene	4.5E+03	1	0.1	0.1	1.45E-06	1.E-07
RM 7 West	Benzo(k)fluoranthene	1.4E+03	1	0.01	0.01	4.60E-07	5.E-09
RM 7 West	Chrysene	-	1	0.001	0.001	-	-
RM 7 West	Dibenzo(a,h)anthracene	7.1E+02	1	1	1	2.30E-07	2.E-07
RM 7 West	Indeno(1,2,3-cd)pyrene	1.4E+03	1	0.1	0.1	4.50E-07	5.E-08
RM 7 West	Total cPAHs as B(a)P Equivalents						**1.E-06**